CONTRACT DATA REQUIREMENTS LIST
(1 Data Item)

Form Approved
OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY:
0001	A	TDP ____ TM ____ OTHER N/A REF: DOD 5010.12-M

D. SYSTEM/ITEM	E. CONTRACT/PR NO.	F. CONTRACTOR
Sea Based Aviation NNR Propulsion		Pratt & Whitney Rocketdyne

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A001	Final Report		

4. AUTHORITY *(Data Acquisition Document No.)*	5. CONTRACT REFERENCE	6. REQUIRING OFFICE	18. ESTIMATED TOTAL PRICE
See Block 16	SOW	ONR CODE 351	

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
See Block 16	B	ONE/R	See Blk 16
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**
See Block 16		See Blk 16	See Blk 16

16. REMARKS

BLOCK 4: See attached for Standard Form 298 Report Documentation Page. Basic Format Requirements (ANSI Based Format Guidelines), and All Purpose Checklist.

BLOCK 7: Inspection and acceptance is required by the Program Officer. The type of voucher in WAWF specified in Section G will be used as a Material Inspection and Receiving Report in lieu of a DD Form 250. Information Copies shall be sent to the appropriate parties in accordance with Enclosure 1.

BLOCK 8, 11, 12, and 13: Contractor shall deliver Final Report, in draft within 60 calendar days after completion of the contract technical effort. The ONR Program Officer will take no more than 30 calendar days to review, edit and return the draft to the Contractor. Upon receipt of the technically reviewed and edited draft, the Contractor shall take no more than 30 calendar days to incorporate all required changes and deliver the Final Report in camera-ready and CD-ROM/DVD electronic copy. The Contractor is encouraged to make maximum use of multimedia options. CD-ROMS/DVDS shall have the following items legibly printed on top of the disk:

1. Contract Number / Program Name
2. CDRL numbers referenced and Title of Data Items
3. Date
4. Company Logo / Nomenclature
5. Distribution Statement

Draft submittal shall consist of 1 editable CD-ROM /DVD. The final camera-ready submittal shall consist of one (1) editable CD-ROM/ DVD with all multimedia source files and editable text documents in the most current software for the IBM PC-type computer, in Microsoft Word/Excel. The final copy shall also include CD-ROM/DVD in published form including final multimedia files converted to PDF format and all read/print executables to access report from MAC, PC and UNIX platforms. Acceptance criteria shall be technical, grammatical, and format accuracy.

Include the Administrative Contracting Officer (ACO) in all e-mail notifications.

Submissions to DTIC should include the SF 298 Report Documentation Page.

(continued on following page)...

14. DISTRIBUTION

a. ADDRESSEE	b. COPIES		
	Draft	Final	
		Reg	Repro
See Enclosure 1			
15. TOTAL →	0	0	0

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
Dr. Joseph Doychak			

CONTRACT DATA REQUIREMENTS LIST

(1 Data Item)

Form Approved
OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY:
0001	A	TDP _____ TM _____ OTHER N/A REF: DOD 5010.12-M

D. SYSTEM/ITEM	E. CONTRACT/PR NO.	F. CONTRACTOR
Sea Based Aviation NNR Propulsion		Pratt & Whitney Rocketdye

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE
A002	CONTRACT FUNDS STATUS REPORT (CFSR)	

4. AUTHORITY *(Data Acquisition Document No.)*	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
	SOW	ONR CODE 351

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
LT	N/A	Quarterly	See Blk 16
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**
N/A		See Blk 16	See Blk 16

16. REMARKS

Tailored so that the report contains forecasts by month for the next six months, by quarter for the remaining fiscal year, and by year for the remaining fiscal years. CFSR data shall be reconciled to the Government's fiscal year end at 30 September if the Contractor's fiscal year end does not coincide with the Government's fiscal year end.

BLOCK 11: The last day of the Contractor's monthly accounting period nearest the end of the Government's fiscal year quarter.

BLOCK 12 and 13: The initial submission shall be within 25 calendar days after the close of the Contractor's monthly accounting period nearest the end of the first government fiscal year quarter after contract award. Subsequent submissions shall be quarterly beginning 25 calendar days after Block 11 time.

Submit electronically, if possible.

14. DISTRIBUTION

a. ADDRESSEE	b. COPIES		
	Draft	Final	
		Reg	Repro
See Enclosure 1			
15. TOTAL →	0	0	0

17. PRICE GROUP

18. ESTIMATED TOTAL PRICE

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
Dr. Joseph Doychak			

CONTRACT DATA REQUIREMENTS LIST

(1 Data Item)

Form Approved
OMB No. 0704-0188

A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY:
0001	A	TDP ____ TM ____ OTHER N/A REF: DOD 5010.12-M

D. SYSTEM/ITEM	E. CONTRACT/PR NO.	F. CONTRACTOR
Sea Based Aviation NNR Propulsion		Pratt & Whitney Rocketdyne

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE	17. PRICE GROUP
A003	Technical Status Report		

4. AUTHORITY *(Data Acquisition Document No.)*	5. CONTRACT REFERENCE	6. REQUIRING OFFICE	18. ESTIMATED TOTAL PRICE
DI-MISC-80711A, See Block 16	SOW	ONR CODE 351	

7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION
LT, See Blk 16	B	QTRLY	See Blk 16
8. APP CODE		**11. AS OF DATE**	**13. DATE OF SUBSEQUENT SUBMISSION**
N/A		N/A	N/A

16. REMARKS

BLOCK 4: Contractor format is acceptable. The DID is cited for guidance as to the content of the report only.

Content should include the following:
- Overview of quarterly progress for all tasks
- Description and Technical status of all tasks
- Issues and Risks
- Planned efforts for next reporting period

Append approved versions of all Test Plans (CDRL A004) and support material from Program Reviews (CDRL A005) that occurred during the reporting period in the submission to the Defense Technical Information Center (DTIC).

BLOCK 7 and 12:
Submit 20 calendar days after the end of each calendar Quarter. Submit 20 calendar days after the end of the first calendar Quarter after award, and thereafter, 20 calendar days after the end of each calendar Quarter.

Acceptance will occur per Section E. If the deliverable is deemed unacceptable, notification and comments will be provided to the Contractor no more than 30 calendar days after receipt of the deliverable. The Contractor will have 30 calendar days to modify the deliverable and resubmit. The process may be repeated, as necessary.

This report shall be submitted in a digital format compatible with Adobe Acrobat Document Format (PDF) and Microsoft Office 2007. The Deliverable shall be sent via encrypted e-mail or posted to a secure server. Submit electronically, if possible. Electronic submittals shall be sent via encrypted e-mail or posted to a secure server.

Include the Administrative Contracting Officer (ACO) in all e-mail notifications.

Submissions to DTIC should include the SF 298 Report Documentation Page.

(continued on following page)...

14. DISTRIBUTION

a. ADDRESSEE	b. COPIES		
	Draft	Final	
		Reg	Repro
See Enclosure 1			
15. TOTAL →	0	0	0

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
Dr. Joseph Doychak			

CONTRACT DATA REQUIREMENTS LIST
(1 Data Item)

Form Approved
OMB No. 0704-0188

The public reporting burden for this collection of information is estimated to average 110 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Department of Defense, Executive Services Directorate (0704-0188). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please do not return your form to the above organization. Send completed form to the Government Issuing Contracting Officer for the Contract/PR No. listed in Block E.

A. CONTRACT LINE ITEM NO. 0001	B. EXHIBIT A	C. CATEGORY: TDP ___ TM ___ OTHER N/A REF: DOD 5010.12-M
D. SYSTEM/ITEM Sea Based Aviation NNR Propulsion	E. CONTRACT/PR NO.	F. CONTRACTOR Pratt & Whitney Rocketdyne

1. DATA ITEM NO. A005	2. TITLE OF DATA ITEM Program Reviews	3. SUBTITLE
4. AUTHORITY *(Data Acquisition Document No.)* See Block 16	5. CONTRACT REFERENCE SOW	6. REQUIRING OFFICE ONR CODE 351

7. DD 250 REQ See Blk 16	9. DIST STATEMENT REQUIRED B	10. FREQUENCY See Blk 16	12. DATE OF FIRST SUBMISSION See Blk 16
8. APP CODE N/A		11. AS OF DATE N/A	13. DATE OF SUBSEQUENT SUBMISSION N/A

17. PRICE GROUP

18. ESTIMATED TOTAL PRICE

14. DISTRIBUTION

a. ADDRESSEE	b. COPIES Draft	Final Reg	Final Repro
See Enclosure 1			
15. TOTAL →	0	0	0

16. REMARKS

BLOCK 4: This CDRL should include the following content for all component/subsystem qualification and verification TRRs

- Description of Test, Test Rig and Test Article
- Test Plans
- Test Requirements and Pass/Fail Criteria

BLOCK 7, 10 and 12: All Program Reviews require Government approval. Test Readiness Reviews will be held on or before 5 working days prior to the associated test. Reviews are not required to be face-to-face meetings.

Required Reviews include:
- Low Loss Inlet/Injectors Test Readiness Review
- Low Loss Inlet/Injectors Study Critical Design Review
- CFD Screening of Low Loss Inlet/Injector Concepts Preliminary Design Review
- Low Loss Inlet/Injector Detailed Design Review
- Annual Reviews

Approval will be provided at the review or within 5 working days of the review.

Submit all presentation materials electronically in a digital format compatible with Adobe Acrobat Document Format (PDF) and Microsoft Office 2007. Submit electronically, if possible. Electronic submittals shall be sent via encrypted e-mail or posted to a secure server. Include the Administrative Contracting Officer (ACO) in all e-mail notifications.

See Technical Status Reports (CDRL A003) for submission of presentation materials under this CDRL to the Defense Technical Information Center (DTIC). Submissions to DTIC should include the SF 298 Report Documentation Page.

Include the Administrative Contracting Officer (ACO) in all e-mail notifications.

(continued on following page)...

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
Dr. Joseph Doychak			

ENCLOSURE NUMBER 1
CONTRACT DATA REQUIREMENTS LIST
INSTRUCTIONS FOR DISTRIBUTION

DISTRIBUTION OF TECHNICAL REPORTS AND FINAL REPORT
(A SF 298 must accompany the final report)

ADDRESSEE	DODAAC CODE	NUMBER OF COPIES	
		UNCLASSIFIED / UNLIMITED	UNCLASSIFIED/ LIMITED AND CLASSIFIED
Program Officer: Dr. Joseph Doychak ONR Code 351 E-Mail: joseph.doychak@navy.mil	N00014	1	1
Administrative Contracting Officer*	S0701A	1	1
Director, Naval Research Lab Attn: Code 5596 4555 Overlook Avenue, SW Washington, D.C. 20375-5320 E-mail: reports@library.nrl.navy.mil	N00173	1	1
Defense Technical Information Center 8725 John J. Kingman Road STE 0944 Ft. Belvoir, VA 22060-6218 E-mail: tr@dtic.mil	HJ4701	1	1

* Send only a copy of the transmittal letter to the Administrative Contracting Officer; do not send actual reports to the Administrative Contracting Officer.

ELECTRONIC SUBMISSIONS OF TECHNICAL REPORTS IS PREFERRED AND ENCOURAGED. ELECTRONIC SUBMISSION SHOULD BE SENT TO THE E-MAIL ADDRESSES PROVIDED IN THE ABOVE TABLE, HOWEVER PLEASE NOTE THE FOLLOWING:

- Only Unlimited/Unclassified document copies may be submitted by e-mail.
- Unclassified/Limited has restricted distribution and a classified document (whether in its entirety or partially) is to be distributed in accordance with classified material handling procedures.
- Electronic submission to DIRECTOR, NAVAL RESEARCH LAB, shall be unclassified/unlimited reports and 30 pages or less. If unclassified and more than 30 pages, hardcopies of reports must be mailed.
- Electronic submission to DTIC shall be unclassified/unlimited reports. If submission is for limited documents please send them in on a disk or sign up for DTIC's web-based document submission system at http://www.dtic.mil. DTIC prefers .pdf, .tif, and .ps files; however, other formats will also be accepted. **NOTE:** DTIC can no longer accept the following file types via email: password protected, zipped or compressed files, file with the extensions: *.vbs, *.cmd, *.exe, *.bat, *.com, *.mp3, *.eml and *.dll.

PR / PO Number	1000001163
PR / PO Status	Approved
PR / PO Approval Date	04/21/2015
Title	Continuous Detonation Engine Risk Reduction Low Loss Inlet/Injector Manifold
Award Number	N/A
Related Award Number	N0001414C0035
PI Last/First Name	Lynch, Edward Douglas
Performer Name	AEROJET ROCKETDYNE OF DE, INC
Performer Number	10236627
Performer Cage Code	02602
PO Last/First Name	DOYCHAK, JOSEPH
PO Office Code	351
PO Phone	703-696-7646
Acq / Grant Specialist	VERA CARROLL
Award Start Date	00/00/0000
Award End Date	00/00/0000
Requested Start Date	06/09/2014
Requested End Date	08/08/2016
PR Type	OTH
Instrument Type	N/A
GFP Tracking Number	N/A
RFx Number	N/A
RFx Response Number	N/A

PO# 4740000093

Funding to be obligated

CLIN	SLIN	ACRN	APPN	SBHD	OBJ	BCN	SA	AAA	TT	PAA	Cost Code
0001	04		1751319	W2DB	255	00014	0	050120	2D	000000	000012929680

Non Navy Funding

CLIN	SLIN	ACRN	APPN	SBHD	OBJ	BCN	SA	AAA	TT	PAA	Cost Code	NonNavy	Station

The table does not contain any data

WBS / Network

WBS/NET Title	WBS/NET Number	PE	Amount	Status	Material Group
FY15 FA-XX Enablers	BS-900035.0016124800 1Y15	4115262123	1,284.20	Approved	AD92

Future Funding

Description	Amount	Date
Historical Line ACRN AA	85,000.00	04/13/2015
Historical Line ACRN AB	325,782.00	04/13/2015
Historical Line ACRN AC	198,423.00	04/13/2015
Future Funding and Expansion	100,408.80	04/13/2015
Future funding for Option 1	169,154.00	06/08/2016

99,659.8

Total Award Value	710,898.00	719N9
Total Obligated by this action	1,284.20	
Basis for Selection	N/A	
Program Type	ONR	
Short Work Statement	Continue participation in the Focused PGC S&T activities based on the standards/desires of the Government Program Officer.	
Notes to Acquisition	This is a contract migration for contract #N00014-14-C-0035. This is an expansion in the amount of $96,000 and to extend the period of performance to 8/8/2016.	
Notes to Financial Mgmt	Code 35 Program Officer: Joe Doychak, 703-696-7646 Code 35 BFM Contractor Support: Rosa Reyes, 703-696-2090 This is not IT related.	
Progress Notes	N/A	

Animal, Human, rDNA Keywords 1	N/A
Animal, Human, rDNA Keywords 2	N/A
Animal, Human, rDNA Keywords 3	N/A
Animal Use	N
Animal Human Use Obj	N/A
Animal Human Use Apprch	N/A
Animal Type 1	N/A
Animal Type 2	N/A
Animal Type 3	N/A
Animal Type 4	N/A
Animal Type 5	N/A
Navy Addendum Number 1	N/A
Navy Addendum Number 2	N/A
Navy Addendum Number 3	N/A
Naval Research & Dev 1	N/A
Naval Research & Dev 2	N/A
Naval Research & Dev 3	N/A
Naval Research & Dev 4	N/A
National Marine Fisheries Services Permit	N/A
Human Subject	N
R tem Cell	N
Stem Cell	N
Conference Information	N/A
Equipment Description	N/A
Equipment Justification	N/A

Brown, Jennifer CIV ONR, 252

From: Velasquez, Yvette AR <Yvette.Velasquez@rocket.com>
Sent: Wednesday, March 25, 2015 15:20
To: Brown, Jennifer CIV ONR, 252; Doychak, Joseph CIV ONRA, 351; Reyes, Rosa CTR ONR, 35; Fisher, Beth M CTR ONR, 35
Cc: Havskjold, Glenn L AR; Bradt, William H AR
Subject: N00014-14-C-0035
Attachments: Cost_Proposal_Spreadsheet_Added Effort 3_20_15.xlsx

Dear Jennifer,

Hope your day is going well. Attached to this email is the SF424A that was requested for the additional work for the referenced contract. Please feel free to contact me should you need additional information or have any questions.

Regards,

yvette

NAME:

Contract Number Modification Number	N0001414C0035 P00001	CLIN:	1
Contract Value	$614,898.00		
Period of Performance (Months)	24		
Total Estimated Cost (TEC)	$570,563.00		
Fixed Fee (FF)	$44,335.00		
Total Funded to Date (TOTF)	$85,000.00		
Funding this Increment (FI)	$325,782.00		

DO NOT CHANGE FIGURES BELOW THIS POINT

Steps:

FF/TEC	=	**0.0777**	**ratio**
FI+TOTF	=	**$410,782.00**	**new total funding**
NEW TOT FUND/RATIO	=	**$381,164.05**	**New Cost**
NEW TOT FUND-NEW COST	=	**$29,617.95**	**New Fee**
EST TIME FUNDS WILL LAST	=	**16.0332**	

TRAVEL ***(Note 1 and 2)***

From: To: Base	Trip Purpose	Number TRIPS	Number TRVLRS	Number DAYS	Number NIGHTS	Air/Rail	Per Diem MEALS	Per Diem LODGING	Car Rental	Parking	Mileage	Conference Fee	Taxi	*Other	TOTAL
Canoga Park Wash D.C.	Mtg w/ONR	1 trip costs	2	3	2	$1,463	$355	$691	$255					$138.00	$2,902
Canoga Park Wash D.C.	Mtg w/ONR	1 trip costs	2	3	2	$1,463	$355	$691	$255					$83.00	$2,847
xx															$0
xx		trip costs				$0	$0	$0	$0						$0
Option 1						$0	$0	$0	$0						$0
Canoga Park Wash D.C.	Mtg w/ONR	trip costs				$0	$0	$0	$0						$0
Canoga Park Monterey CA	Testing	trip costs				$0	$0	$0	$0						
xx		trip costs				$0	$0	$0	$0						$0
xx		trip costs				$0	$0	$0	$0						$0
xx		trip costs				$0	$0	$0	$0						$0
TOTAL															$5,749

*consists of escalation on base data

Note 1: Estimates and the resultant costs claimed must conform to the applicable Federal cost principles.

Note 2: Include a separate section in the above table for the base and each option

Note 3: If there are miscellaneous expenses associated with the trip, provide description and rationale.

Note 4: Per Diem Rates proposed should not exceed General Services Administration (GSA) Per Diem rates for the destination area, available at http://www.gsa.gov/portal/category/21287

CR NUMBER: 15PR13961-00 REQ NUMBER: 3172111 PO NUMBER:

PREVIOUS CR NUMBER: 14PR10324-01

TITLE: CONTINUOUS DETONATION ENGINE RISK REDUCTION: LOW LOSS INLET/INJECTOR MANIFOLD

AWARD NUMBER: N0001414C0035 SHORT CONTRACTOR CODE: PWRI

NAVRIS NUMBER: 1104819 UIC/CAGE CODE: 02602

RELATED NAVRIS NUMBER:

MODIFICATION NUMBER: P00003

SIZE AND TYPE OF BUSINESS: LARGE BUS./NONMINORITY/NOT WOMEN-OWNED

PI NAME: LYNCH, EDWARD D

PERFORMER: AEROJET ROCKETDYNE OF DE, INC

PO NAME: DOYCHAK, JOSEPH, Int. PO

PO CODE: 351 PO PHONE: (703) 696-7646

POINT OF CONTACT: POC PHONE:

GRANTS OFFICER: CHENEY, CAITLIN L

CURRENT AWARD START DATE: 06-JUN-14

CURRENT AWARD END DATE: 06-JUN-16

PO REQUESTED START DATE: 12-FEB-15

CR TYPE: INCREMENTAL FUNDING

INTERNAL COORDINATOR(S): PHONE:

INCE, TRACI L. (703) 696-7120

INSTRUMENT TYPE: CONTRACT

BASIS FOR SELECTION: OTH

CBD DATE: 20-DEC-2012 FNC: NO

CURRENT FUNDING:

BLI	ACRN	APPN	SBHD	OBJ	PARM	BCN	SA	AAA	TT	PAA	COSTCODE	ITEM
Default		1319	W2DB	2551	RA	RA353	0	068342	2D	000000	00000000AC10	Funding Request

FRC TITLE	BA	FY	FRC	PE	AMOUNT	STATUS	FUND SOURCE	OPTION
Propulsion Technology	2	2015	5AC1	0602123N	$198,423.00	APPROVED	DIRECT	NO

FUTURE FRC:

ITEM	FY	FRC	OPTION	START DATE	AMOUNT
Option 01	2015		YES	01-SEP-15	$169,154.00
Funding Request	2016		NO	01-OCT-15	$5,693.00

CR STATUS: APPROVED

CUMULATIVE TOTAL AWARD VALUE: $614,898.00

TOTAL VALUE FOR CR: $198,423.00

INCREMENTAL VALUE: $198,423.00

MODIFICATION NEGOTIATED VALUE: $198,423.00

SHORT WORK STATEMENT:

FY15 funds are provided for:

BASE EFFORT

Task 1.0 Program Management
The Contractor shall exercise administration and management functions throughout the course of the effort such as scheduling of activities and milestones, describing status, outlining Contractor activity and progress toward accomplishment of objectives, planning, forecasting, and making recommendations on funding and funding changes, program planning; and describing in detail the conduct and overall results of the effort. The Contractor shall provide a Kick-off Meeting, Technical Status Reports, Contract Funds Status Reports, Annual Program Reviews and a Final Report.

Task 2.0 Analytical and Mechanical Design of Low Loss Inlet/Injector

Task 2.1 Low Loss Inlet/Injector Study
The Contractor shall identify a series of concept designs for subsequent detailed analysis. The Contractor shall conduct a Concept Design Review at the culmination of the task for Government approval.

Task 2.2 CFD Screening of Low Loss Inlet/Injector Concepts
Upon Government approval of the Concept Design Review, the Contractor shall conduct unsteady CFD analyses of the concepts selected in Task 2.1 and shall identify initial test conditions necessary to validate the concepts. The Contractor shall conduct a Preliminary Design Review at the culmination of the task for Government approval. It is anticipated that up to three inlet/injector designs will be carried forward for testing.

Task 2.3 Design Test Articles
Upon Government approval of the Preliminary Design Review, the Contractor shall perform mechanical design to adapt the selected inlet designs to the existing engine hardware that will be used for the design phase. The Contractor shall conduct a Detail Design Review of the mechanical design results for Government approval.

Task 3.0 Test Low Loss Inlet/Injectors

Task 3.1 Test Plan
The Contractor shall generate and submit a Test Plan that includes a list of tests and the instrumentation to be used.

Task 3.2 Test Hardware Fabrication and Assembly
Upon Government approval of the Detail Design Review, the Contractor shall fabricate and assemble the test hardware.
?

Task 3.3 Test Preparation
The Contractor shall prepare and conduct a Test Readiness Review (TRR) for Government approval.

Task 3.4 Testing
The Contractor shall conduct three (3) weeks of testing at the Naval Postgraduate School. Conditions and supplies that will be needed for the testing include using nonvitiated air supplied up to 10 lbm/sec, up to

300 psia, and up to 800 ?F, Grade A methane (natural gas) supplied up to 0.55 lbm/sec, up to 600 psia at ambient pressure, supplemental oxygen to the RDE test rig as a contingency for detonation trouble shooting, cooling water up to 40 gpm, water cooling to PCB high frequency sensors, single K bottles or equivalent source capacity of oxygen, hydrogen, and nitrogen to the PWR-provided ignition system, low speed data acquisition (DAQ) up to 20 channels and up to 6 channels of DAQ for high speed instrumentation at a minimum, visible spectrum high speed video capable of at least 120,000 frames/second, all digital data being delivered to PWR on encrypted portable hard drives.

Task 3.5 Post-test Analysis
The Contractor shall perform CFD analyses to interpret the test measurements and refine the modeling approaches. The Contractor shall assess the performance of the low loss inlet/injector concepts, identify factors that could limit or improve performance, and recommend a starting point for going forward in the development of a practical low loss inlet/injector (Generation 2). The Contractor shall assess the capabilities required for a CFD code to analyze low loss inlet/injector concepts and identify any needed CFD development for going forward. The Contractor shall conduct a Post-test Review which will contain a brief go-forward plan for a second generation low loss inlet/injector.

NOTES:

Approach:

The approach to the proposed work leverages recent work from several sources. Pratt & Whitney Rocketdyne (PWR) has completed over 400 tests on 21 different injector/combustor geometries in three internally funded programs and one SBIR (supporting HyPerComp in their development of computational fluid dynamics (CFD) codes for RDEs) funded by the Defense Advanced Research Projects Agency (DARPA). PWR has also been heavily involved in performing CFD analyses on the Vulcan program funded by DARPA. PWR plans to work collaboratively with the Naval Research Laboratory (NRL) CFD personnel who have been working on pressure gain combustion. The proposed program intends to perform testing in the second year at the Naval Postgraduate School and thereby leverage the pressure gain combustion and diagnostic capabilities that have been developed there.

Deliverables:

4.0 Deliverables

Task 1.0 Program Management
Kick-off Meeting; Technical Status Reports; Contract Funds Status Reports; Annual Program Reviews & a Final Report

Task 2.0 Analytical Design of Low Loss Inlet/Injector

Task 2.1 Low Loss Inlet/Injector Study
Concept Design Review

Task 2.2 CFD Screening of Low Loss Inlet/Injector Concepts
Preliminary Design Review

Task 2.3 Design Test Articles
Detail Design Review

Task 3.0 Test Low Loss Inlet/Injectors

Task 3.1 Test Plan
Test Plan

Task 3.2 Test Hardware Fabrication and Assembly
Low loss inlet/injector test articles

Task 3.3 Test Preparation
Test Readiness Review

Task 3.5 Post-test Analysis
Post-test Review

Task 4.0 Option: Generation 2 Inlet/Injector
Generation 2 inlet/injector test article(s)

Extended Work Statement:

OPTION EFFORT

Task 4.0 Option: Generation 2 Inlet/Injector
The Contractor shall upgrade CFD codes to provide the necessary capabilities identified in Task 3.5. The Contractor shall perform CFD analyses of the Generation 2 Low Loss Inlet/Injector concept based on the starting point recommended in Task 3.5. The Contractor shall perform mechanical design and then shall fabricate the Generation 2 Inlet/Injector test article. The Contractor shall prepare a test plan and shall execute a hot fire test program on the Generation 2 Inlet/Injector similar to that executed in Task 3.4. T he Contractor shall perform additional CFD analyses to interpret the test measurements. The Contractor shall perform Program Management for Task 4.0.

Miscellaneous:

FY15 Checkbook (2015 5AC1) Row #: 3

ONR Mission/Relevance:

The proposed research directly addresses Energy Efficient Processes and Subsystems in Sea Based Aviation by focusing on risk reduction to increase the Technology Readiness Level of pressure gain combustion. The RDE presents an alternative to the baseline combustor for driving the turbine and could be integrated into aircraft propulsion, thus allowing additional fighter range due to reduced SFC for RDE combustors. RDE integration also has the potential to increase mission duration and range for UAVs and/or cruise missiles, as well as the potential to enable innovative lift fan concepts.

Objective:

The overall program objective is to develop injector/manifold designs and an inlet design for the airstream of a rotating detonation engine (RDE) combustor operating in conditions representative of the combustor in a gas turbine. Low loss propellant introduction and airstream inlet design have been identified as a key technical risk and fundamental research challenge, respectively, for RDEs.

ARTICLES:

CR NUMBER: 14PR10324-00 REQ NUMBER: 3169034 PO NUMBER:

PREVIOUS CR NUMBER: 13PR07643-00

TITLE: CONTINUOUS DETONATION ENGINE RISK REDUCTION: LOW LOSS INLET/INJECTOR MANIFOLD

AWARD NUMBER: N0001414C0035 SHORT CONTRACTOR CODE: PWRI
NAVRIS NUMBER: 1104819 UIC/CAGE CODE: 02602
RELATED NAVRIS NUMBER:
MODIFICATION NUMBER:

SIZE AND TYPE OF BUSINESS: LARGE BUS./NONMINORITY/NOT WOMEN-OWNED
PI NAME: LYNCH, EDWARD D
PERFORMER: PRATT & WHITNEY ROCKETDYNE, INC.

PO NAME: DOYCHAK, JOSEPH, Int. PO
PO CODE: 351 PO PHONE: (703) 696-7646
POINT OF CONTACT: POC PHONE:
GRANTS OFFICER: NO/NEG
CURRENT AWARD START DATE: 06-JUN-14
CURRENT AWARD END DATE: 06-JUN-16
PO REQUESTED START DATE: 06-JUN-14

CR TYPE: INCREMENTAL FUNDING
INTERNAL COORDINATOR(S): PHONE:
INCE, TRACI L. (703) 696-7120
INSTRUMENT TYPE: CONTRACT
BASIS FOR SELECTION: OTH
CBD DATE: 20-DEC-2012 FNC: NO

Caitlin

CURRENT FUNDING:

BLI	ACRN	APPN	SBHD	OBJ	PARM	BCN	SA	AAA	TT	PAA	COSTCODE	ITEM
Default		1319	W2DB	2551	RA	RA353	0	068342	2D	000000	00000000AC10	Funding Request

FRC TITLE	BA	FY	FRC	PE	AMOUNT	STATUS	FUND SOURCE	OPTION
Propulsion Technology	2	2014	5AC1	0602123N	$325,782.00	APPROVED	DIRECT	NO

FUTURE FRC:

ITEM	FY	FRC	OPTION	START DATE	AMOUNT
Funding Request	2015		NO	01-OCT-14	$204,116.00
Option 01	2015		YES	01-SEP-15	$169,154.00

CR STATUS: APPROVED

CUMULATIVE TOTAL AWARD VALUE:
TOTAL VALUE FOR CR: $325,782.00
INCREMENTAL VALUE: $325,782.00
MODIFICATION NEGOTIATED VALUE: $325,782.00
SHORT WORK STATEMENT:
FY14 funds are provided for:

BASE EFFORT

Task 1.0 Program Management
The Contractor shall exercise administration and management functions throughout the course of the effort such as scheduling of activities and milestones, describing status, outlining Contractor activity and progress toward accomplishment of objectives, planning, forecasting, and making recommendations on funding and funding changes, program planning; and describing in detail the conduct and overall results of the effort. The Contractor shall provide a Kick-off Meeting, Technical Status Reports, Contract Funds Status Reports, Annual Program Reviews and a Final Report.

Task 2.0 Analytical and Mechanical Design of Low Loss Inlet/Injector

Task 2.1 Low Loss Inlet/Injector Study
The Contractor shall identify a series of concept designs for subsequent detailed analysis. The Contractor shall conduct a Concept Design Review at the culmination of the task for Government approval.

Task 2.2 CFD Screening of Low Loss Inlet/Injector Concepts
Upon Government approval of the Concept Design Review, the Contractor shall conduct unsteady CFD analyses of the concepts selected in Task 2.1 and shall identify initial test conditions necessary to validate the concepts. The Contractor shall conduct a Preliminary Design Review at the culmination of the task for Government approval. It is anticipated that up to three inlet/injector designs will be carried forward for testing.

Task 2.3 Design Test Articles
Upon Government approval of the Preliminary Design Review, the Contractor shall perform mechanical design to adapt the selected inlet designs to the existing engine hardware that will be used for the design phase. The Contractor shall conduct a Detail Design Review of the mechanical design results for Government approval.

Task 3.0 Test Low Loss Inlet/Injectors

Task 3.1 Test Plan
The Contractor shall generate and submit a Test Plan that includes a list of tests and the instrumentation to be used.

Task 3.2 Test Hardware Fabrication and Assembly
Upon Government approval of the Detail Design Review, the Contractor shall fabricate and assemble the test hardware.
?

Task 3.3 Test Preparation
The Contractor shall prepare and conduct a Test Readiness Review (TRR) for Government approval.

Task 3.4 Testing
The Contractor shall conduct three (3) weeks of testing at the Naval Postgraduate School. Conditions and supplies that will be needed for the testing include using nonvitiated air supplied up to 10 lbm/sec, up to

300 psia, and up to 800 ?F, Grade A methane (natural gas) supplied up to 0.55 lbm/sec, up to 600 psia at ambient pressure, supplemental oxygen to the RDE test rig as a contingency for detonation trouble shooting, cooling water up to 40 gpm, water cooling to PCB high frequency sensors, single K bottles or equivalent source capacity of oxygen, hydrogen, and nitrogen to the PWR-provided ignition system, low speed data acquisition (DAQ) up to 20 channels and up to 6 channels of DAQ for high speed instrumentation at a minimum, visible spectrum high speed video capable of at least 120,000 frames/second, all digital data being delivered to PWR on encrypted portable hard drives.

Task 3.5 Post-test Analysis
The Contractor shall perform CFD analyses to interpret the test measurements and refine the modeling approaches. The Contractor shall assess the performance of the low loss inlet/injector concepts, identify factors that could limit or improve performance, and recommend a starting point for going forward in the development of a practical low loss inlet/injector (Generation 2). The Contractor shall assess the capabilities required for a CFD code to analyze low loss inlet/injector concepts and identify any needed CFD development for going forward. The Contractor shall conduct a Post-test Review which will contain a brief go-forward plan for a second generation low loss inlet/injector.

NOTES:

Approach:

The approach to the proposed work leverages recent work from several sources. Pratt & Whitney Rocketdyne (PWR) has completed over 400 tests on 21 different injector/combustor geometries in three internally funded programs and one SBIR (supporting HyPerComp in their development of computational fluid dynamics (CFD) codes for RDEs) funded by the Defense Advanced Research Projects Agency (DARPA). PWR has also been heavily involved in performing CFD analyses on the Vulcan program funded by DARPA. PWR plans to work collaboratively with the Naval Research Laboratory (NRL) CFD personnel who have been working on pressure gain combustion. The proposed program intends to perform testing in the second year at the Naval Postgraduate School and thereby leverage the pressure gain combustion and diagnostic capabilities that have been developed there.

Deliverables:

4.0 Deliverables

Task 1.0 Program Management
Kick-off Meeting; Technical Status Reports; Contract Funds Status Reports; Annual Program Reviews & a Final Report

Task 2.0 Analytical Design of Low Loss Inlet/Injector

Task 2.1 Low Loss Inlet/Injector Study
Concept Design Review

Task 2.2 CFD Screening of Low Loss Inlet/Injector Concepts
Preliminary Design Review

Task 2.3 Design Test Articles
Detail Design Review

Task 3.0 Test Low Loss Inlet/Injectors

Task 3.1 Test Plan
Test Plan

Task 3.2 Test Hardware Fabrication and Assembly
Low loss inlet/injector test articles

Task 3.3 Test Preparation
Test Readiness Review

Task 3.5 Post-test Analysis
Post-test Review

Task 4.0 Option: Generation 2 Inlet/Injector
Generation 2 inlet/injector test article(s)

Extended Work Statement:

OPTION EFFORT

Task 4.0 Option: Generation 2 Inlet/Injector
The Contractor shall upgrade CFD codes to provide the necessary capabilities identified in Task 3.5. The Contractor shall perform CFD analyses of the Generation 2 Low Loss Inlet/Injector concept based on the starting point recommended in Task 3.5. The Contractor shall perform mechanical design and then shall fabricate the Generation 2 Inlet/Injector test article. The Contractor shall prepare a test plan and shall execute a hot fire test program on the Generation 2 Inlet/Injector similar to that executed in Task 3.4. T he Contractor shall perform additional CFD analyses to interpret the test measurements. The Contractor shall perform Program Management for Task 4.0.

Miscellaneous:

FY14 Checkbook (2014 5AC1) Row #: 2

ONR Mission/Relevance:

The proposed research directly addresses Energy Efficient Processes and Subsystems in Sea Based Aviation by focusing on risk reduction to increase the Technology Readiness Level of pressure gain combustion. The RDE presents an alternative to the baseline combustor for driving the turbine and could be integrated into aircraft propulsion, thus allowing additional fighter range due to reduced SFC for RDE combustors. RDE integration also has the potential to increase mission duration and range for UAVs and/or cruise missiles, as well as the potential to enable innovative lift fan concepts.

Objective:

The overall program objective is to develop injector/manifold designs and an inlet design for the airstream of a rotating detonation engine (RDE) combustor operating in conditions representative of the combustor in a gas turbine. Low loss propellant introduction and airstream inlet design have been identified as a key technical risk and fundamental research challenge, respectively, for RDEs.

ARTICLES:

Stacey 6/21

CR NUMBER: 13PR07643-00 **REQ NUMBER:** 3158468 **PO NUMBER:**

PREVIOUS CR NUMBER:

TITLE: CONTINUOUS DETONATION ENGINE RISK REDUCTION: LOW LOSS INLET/INJECTOR MANIFOLD

AWARD NUMBER: N0001413C0349 **SHORT CONTRACTOR CODE:** PWRI
NAVRIS NUMBER: 1104819 **UIC/CAGE CODE:** 02602
RELATED NAVRIS NUMBER:
MODIFICATION NUMBER:

SIZE AND TYPE OF BUSINESS: LARGE BUS./NONMINORITY/NOT WOMEN-OWNED
PI NAME: LYNCH, EDWARD D
PERFORMER: PRATT & WHITNEY ROCKETDYNE, INC. (PWR)
PO NAME: DOYCHAK, JOSEPH, Int. PO
PO CODE: 351 **PO PHONE:** (703) 696-7646
POINT OF CONTACT: **POC PHONE:**

GRANTS OFFICER: NO NEG
CURRENT AWARD START DATE: 01-SEP-13
CURRENT AWARD END DATE: 31-AUG-16
PO REQUESTED START DATE: 01-SEP-13

CR TYPE: NEW
INTERNAL COORDINATOR(S): **PHONE:**
INCE, TRACI L. (703) 696-7120
INSTRUMENT TYPE: CONTRACT
BASIS FOR SELECTION: OTH
CBD DATE: 20-DEC-2012 **FNC:** NO

CURRENT FUNDING:

BLI	ACRN	APPN	SBHD	OBJ	PARM	BCN	SA	AAA	TT	PAA	COSTCODE	ITEM
Default		1319	W2DA	2551	RA	RA353	0	068342	2D	000000	00000000AZ30	Funding Request

FRC TITLE	BA	FY	FRC	PE	AMOUNT	STATUS	FUND SOURCE	OPTION
Program Support	2	2013	5AZ3	0602114N	$85,000.00	APPROVED	DIRECT	NO

FUTURE FRC:

ITEM	FY	FRC	OPTION	START DATE	AMOUNT
Funding Request	2013		NO	01-SEP-13	$433,467.00
Option 01	2015		YES	01-SEP-15	$228,739.00

CR STATUS: APPROVED

CUMULATIVE TOTAL AWARD VALUE: $518,467.00
TOTAL VALUE FOR CR: $85,000.00
INCREMENTAL VALUE: $85,000.00
MODIFICATION NEGOTIATED VALUE: $85,000.00

B option
518,467 + 228,739

SHORT WORK STATEMENT:
FY13 funds are provided to begin work:

BASE EFFORT

Task 1.0 Program Management
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Contractor Qualifications:

The proposed performer provides the unique capabilities and experience of the principal investigator/key personnel as described in the proposal and possesses the necessary facilities for conduct of the proposed work. To the best of the program officer's knowledge, all previously funded work by this performer has been completed in a satisfactory manner.

Deliverables:

4.0 Deliverables

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Post-test Review

Task 4.0 Option: Generation 2 Inlet/Injector
Generation 2 inlet/injector test article(s)

Extended Work Statement:
OPTION EFFORT

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Miscellaneous:
SBA NNR 6.2 funds (2013 5AZ3)

ONR Mission/Relevance:

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Overall Merits:

Pratt & Whitney Rocketdyne will develop injector/manifold designs and an inlet design for the airstream of a rotating detonation engine (RDE) combustor operating in conditions representative of the combustor in a gas turbine. The continuous or rotating detonation engine (RDE) has recently received renewed interest due to its potential high thermodynamic efficiency based on cycle performance from the idealized Fickett-Jacobs cycle and CFD computations such as those by the Naval Research Laboratory (NRL). Low loss propellant introduction and airstream inlet design has been identified as the number one technical risk and fundamental research challenge for RDE's. Proposed analytical work will identify and characterize low loss inlet designs, followed by testing to demonstrate the performance of the designs, and an Optional effort to consolidate and synthesize the findings from the earlier Basic Base program efforts into one or more Generation 2 inlet/injector designs which would be fabricated and tested.

PI Qualifications:

The Principal Investigator is highly qualified to execute the proposed program based on previous experience, publications, and presentations as described in the proposal.

Submission, Evaluation, Cost:

This proposal was received in response to: BAA 13-001 and Special Notice 12-SN-0018 dated 1 Oct 2012.

This proposal was recommended for award based on an evaluation of the proposal in accordance with criteria specified in the solicitation. A copy of the evaluation is maintained in the program officer's files.

The proposed cost/budget included in the proposal has been reviewed and, with the exception of the items listed below, are determined to be reasonable and necessary, as to the items, quantity, and amounts proposed for accomplishment of the proposed work. With the exception of the items noted below, to the extent the following items are included in the proposal the review concluded that: The labor categories and hours proposed appear consistent with the effort required to conduct the proposed work. The labor rates proposed appear consistent with standard industry/university averages. The materials and equipment proposed are necessary for the efficient conduct of the proposed work. The subcontracts proposed are consistent with the proposed execution of the project and appear reasonable as to performer and amount. The consultant hours

proposed appear reasonable and necessary for the efficient conduct of the work and do not exceed an average rate of $125 per hour/$1,000 per day without a justification provided in the "Notes to Acquisition" section in this PR. The quantities, types and amount of any other direct charges to include costs for printing, travel, supplies, and computer usage appear reasonable and necessary for the efficient conduct of the proposed work. To the extent the cost of other relevant work is known, the proposed total amount is consistent with the costs of this other work. The total amount proposed does not exceed that reasonably estimated as the value of the work to be performed.

Cost Item Questioned	Amount Questioned	Rationale for Suggested Changes

ARTICLES: